

stopped and of being quickly started, either ahead or astern; (c) it must be capable of being promptly speeded to any desired point between full speed and dead slow, which latter speed ought not to be greater than one-quarter of the full speed; (d) it must be capable of working well, not only in smooth water, but in heavy weather in a seaway in which the varying immersion of the propeller causes rapidly changing conditions of resistance. In marine engines the revolutions are practically proportional to the speed of the ship, and as the vessel's resistance increases much more rapidly than the speed, it follows that for a reduction of speed of revolution the mean effective pressure must be reduced much more than in proportion to the revolutions. This is a much more difficult problem in marine engines, where no fly-wheel is practicable, than on land, where the use of a heavy fly-wheel permits the suppression of alternate fuel charges.

A LITTLE essay of twenty-four pages has been published by M. Prosper de Lafitte on "The Magic Square of  $n$  with  $n$  Numbers." By this is meant a square with  $n^2$  spaces, containing the numbers from 1, 2, 3, . . .  $n$  each repeated  $n$  times, in such a way that each row, each column, and each diagonal contains each number once. This is, of course, a slightly different problem from that of the ordinary magic square, which contains all the numbers from 1 up to  $n^2$ ; and the author's claim to have produced a paper calculated to instruct as well as to entertain the reader is well justified. Messrs. Gauthier-Villars, of Paris, are the publishers.

In the *Atti dei Lincei*, xv., 10, Dr. Pietro Macchia discusses the relations between thermal conductivities at ordinary and at low temperatures. In determining the conductivity, observation is made of the distribution of temperature in a rod subject to surface radiation, when the flow of heat has become steady. Even at moderate temperatures results based on Stefan's law are shown to be better than those derived from Newton's law of cooling. Thus for pure lead, the ratio of the conductivities deduced from Stefan's law, for temperatures 18° and 100° respectively, works out at 1.016; Jäger and Diesselhorst's determinations, based on the consideration of non-stationary states, give 1.015, while the assumption of Newton's law gives 2.01.

MESSRS. A. E. STALEY AND CO., of 19 Thavies Inn, Holborn Circus, E.C., have submitted for our inspection a pair of their new "Nikos," 8x, prismatic binoculars, which are sold at the low price of 6l. 10s. The instrument is beautifully finished in Russia leather, and is of a very compact, light, and handy form, whilst its performance optically satisfied the critical tests to which we subjected the pair examined. There is a common focussing screw for both eye-pieces, one of which is fitted, however, with a separate arrangement, and the bending bar is adjustable to the distance between the observer's eyes by simply bending it the required amount. Both the special focussing arrangement and the bending bar are provided with scales, so that the habitual user may adjust the glasses before using them without having to make a series of trials each time. A pair of studs projecting from the object-glass end of the glasses enables the latter to stand flat on any horizontal surface.

THE issue of "Hazell's Annual" for 1907 is now available. The alphabetical arrangement of this cyclopaedic record reduces the trouble of reference to a minimum, and the comprehensive character of the contents makes the volume of wide interest.

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A THIRD edition of "The Mechanism of Weaving," by Mr. Thomas W. Fox, of the Manchester Municipal School of Technology, has been published by Messrs. Macmillan and Co., Ltd. The opportunity has been taken to revise the text carefully, to add matter relating to recent developments in weaving, to introduce numerous new illustrations, and generally to enhance the value of the work from the points of view of teachers, students, and men actively engaged in the cotton industry.

THE thirteenth edition of "Practical Sanitation," by Dr. George Reid, has been published by Messrs. C. Griffin and Co., Ltd. The appendix on sanitary law, by Mr. H. Manley, has been entirely re-written, and other parts of the work have undergone detailed revision, particularly the chapter which deals with sewage disposal. The work provides medical officers of health, sanitary inspectors and others interested in sanitation with a comprehensive survey of the practical and scientific aspects of sanitary science.

WE have received a copy of the first number of the *African Monthly*, a magazine to be devoted to literature, history, exploration, science, and art, as well as fiction. The new periodical is published by the African Book Company, Ltd., of Grahamstown, Cape Colony, and its price is 1s. The contents of the first issue are varied and interesting; scientific subjects are represented by two articles, "The Bantu in the Tenth Century." As described in Extracts from the 'Golden Meadows' of Al Mas'udy," by Mr. W. Hammond Tooke, and "Merino Sheep Breeding in Australia," by Mr. R. H. Harrowell. The magazine may be obtained in this country from Messrs. Wm. Dawson and Sons, Ltd., Cannon House, Breams Buildings, London, E.C.

#### OUR ASTRONOMICAL COLUMN.

THE RECENT TOTAL ECLIPSE OF THE SUN.—A telegram received by Prof. Kreutz from Prof. R. Schorr at Dschisak, in the province of Samarkand, states that during the whole time that the sun was eclipsed on January 14 the sky was totally obscured, and snow fell heavily. Only meteorological and some photometric observations were possible (*Astronomische Nachrichten*, No. 4150).

Herr Archenhold has received a similar message from another observer at Samarkand, whilst the Moscow observers are reported to have obtained no results even in the meteorological and photometric programme (*Das Weltall*, January 15).

THE SOLAR RADIATION.—The depression of the "solar radiation" during 1903, as observed at Warsaw, is dealt with in a paper communicated to the *Bulletin météorologique du Département de l'Hérault* by M. Ladislav Gorczyński. The observations showed that between December, 1902, and February, 1904, the radiation was abnormally low as compared with the mean for the years 1901-5. This phenomenon has previously been commented upon by various observers, and is supposed to have been due to the large amount of volcanic dust in our atmosphere. Two other abstracts from the same bulletin deal respectively with the variations of the intensity of the solar radiation with the height of the sun, and the amount of the insolation at Warsaw, Treurenberg, and Montpellier.

PHOTOGRAPHS OF GIACOBINI'S COMET (1905c).—The way in which a comet's tail develops as the comet approaches perihelion is beautifully shown by a series of photographs of Giacobini's 1905 comet which are published in Bulletin No. 25 of the Lowell Observatory. The series extends from December 14, 1905—eight days after the comet's discovery—when the object showed only a well-defined nucleus, to January 7, 1906, when three distinct tails are shown, the middle one extending to a distance of 10° from the head.

On December 29 two tails were shown, one of which was made up of four distinct streamers with nebulous matter between them; two of these streamers were crossed so as to present a twisted appearance, whilst the two outside ones diverged in the usual manner. On no two negatives are the images the same, the day-to-day development being very marked. Between January 3 and 4 there was a decided change in the position-angle of the extremity of the tail, which is shown in a striking manner by the superposition of the two oriented images, and is somewhat similar to that recorded by Prof. Barnard in the case of Brooks's comet 1893 iv.

**THE RED SPOT ON JUPITER, 1905-6.**—The results of Mr. Stanley Williams's observations of the Great Red Spot during the opposition of 1905-6 appear in No. 4150 of the *Astronomische Nachrichten*. The transit times of the spot were all observed by simple eye estimates, care being taken to avoid looking at the Red Spot Hollow, which, as compared with the spot itself, was a very conspicuous feature. The rotation period, as determined from 635 rotations, was found to be 9h. 55m. 41.46s., a value slightly less than that determined from the 1904-5 opposition. The mass of dark material, which circles round the belt in which the spot is situated, overtook the spot during the last week in March, 1906.

Micrometer measures made during the period November, 1905, to February, 1906, showed the mean longitude of the Red Spot Hollow to be  $29^{\circ}.41$ , a position some  $1^{\circ}.3$  following the spot itself. Mr. Williams discusses the relative accuracy of the micrometer method at some length, and, from his experience, arrives at the conclusion that it is likely to introduce errors due to the alteration of the appearance of the observed feature caused by the superposition of the micrometer wires a conclusion which is confirmed by other observers of Jovian phenomena.

**A PECULIAR SHORT-PERIOD VARIABLE (155.1906 CASSIOPEÆ).**—From a number of observations made at Potsdam during 1906, Messrs. Müller and Kempf find that the sixth-magnitude star B.D.-68° 200 is a variable, with a period of 1.95 days and a remarkably small range of light variation, the whole amplitude amounting to only 0.33 magnitude (*Astronomische Nachrichten*, No. 4148).

### THE BRITISH SCIENCE GUILD.

THE first annual meeting of the British Science Guild was held at the Mansion House on Monday, January 28. Just fifteen months have passed since the inauguration of the Guild in October, 1905, and the very large gathering of sympathisers with the new movement was eloquent of the fact that the hopes and confident expectations of its organisers have not been disappointed. The Lord Mayor, Sir W. Treloar, presided, and was supported by the president, the Right Hon. R. B. Haldane, and Sir Norman Lockyer, the chairman of committees. Many eminent representatives of science, industry, and the educational world were present.

The Lord Mayor having opened the meeting by offering a warm welcome to the Guild, Sir Norman Lockyer gave an outline of work accomplished since its inception, touching on the main points mentioned in the report, of which the following is an abstract. The first part was purely historical. It stated what the committees have done. Though their activities have not figured so prominently before the general public outside, it must be remembered that the more important the work was going to be, the more quiet must it be in the first instance. The first public outcome of the Guild was connected with the report of the Departmental Committee appointed to consider the question raised by the proposed new Technological Institution at South Kensington, and the fear that the scheme might be delayed in consequence of certain differences of opinion as to the constitution of the governing body. The result was the letter to the *Times* last year, in which the Guild urged most strongly that neither the question of the ultimate and final relationship of the new institution

to London University nor any other matter should be allowed to interfere with the immediate appointment of at least an organising governing body.

The next important point to which the report refers was that of the grant to the National Physical Laboratory; it described the happy result of Mr. Haldane's interposition with the Treasury in obtaining an increase of the grant from 5000*l.* to 10,000*l.*

At the request of various bodies, the Guild has taken part in several important deputations. Sir John Cockburn represented the Guild on a deputation to the President of the Board of Trade urging the importance of the compulsory working of patents.

On account of certain changes contemplated by the Government, the council of the Royal Society of Edinburgh asked for the support of the Guild in the matter of obtaining suitable buildings to house the society, and also a suitable grant for yearly expenses. This support was most cordially given by the executive committee. The sum originally proposed to be expended by the Government on the new buildings was 14,000*l.*, but the final result of the action of a committee and of the representations made by the deputation, on which the Guild was represented by Sir W. Ramsay, K.C.B., was to secure for the society a sum of 25,000*l.* for the purchase of a building, 3000*l.* to cover the expenses of fitting it up, and a yearly grant not exceeding 600*l.* a year. The council of the Royal Society of Edinburgh has expressed the opinion that these arrangements are quite satisfactory (see p. 205).

Several communications were received from the officers of the Marine Biological Association urging the Guild to form part of a deputation to the Chancellor of the Exchequer on the subject of the continuation of the grant in aid of the International Fisheries' Investigations. Sir Michael Foster, K.C.B., was nominated to represent the Guild on the deputation, which, introduced by the Right Hon. Austen Chamberlain, M.P., was, in the unavoidable absence of the Chancellor of the Exchequer, received by the Parliamentary Secretary, Mr. McKenna, M.P., on December 18, 1906 (see p. 185).

In June the Guild received a communication from the anthropometric committee of the British Association, in relation to a deputation to the Prime Minister urging him to appoint a commission to carry out a periodic anthropometric survey of school children and adults. It is proposed that this commission shall be constituted on the same lines as the advisory council recommended by the Physical Deterioration Committee, and preferably should be under the direct control of the Prime Minister, like the Defence Committee. The proposed anthropometric survey would also be on the lines recommended by the Physical Deterioration Committee. The executive committee considers the proposed survey as a most important application of science to statecraft, and has nominated a representative of the Guild to attend the deputation which the Prime Minister has consented to receive after the recess.

The education committee has had before it a proposal to form two new committees, one dealing with elementary and secondary education, especially in relation to the introduction of leaving certificates from the primary school, and the importance of practical scientific training in both. It was proposed that the second educational committee should consider the question of an increased endowment of universities by the State. Referring to this committee, Sir Norman Lockyer remarked that the private endowment of American universities last year amounted to five millions sterling. It is hard for us as a nation to compete with that. Germany is strengthening its universities just as thoroughly as it is strengthening its Fleet, a reminder that we ought to be able to compete with other nations in the preparation and equipment for industrial progress, as well as for war.

The report recorded the overtures made to the Franco-British Exhibition Committee, as the outcome of which the exhibition committee's desire to include science in their programme was stated. The assistance of the Guild was asked in the formation of the science section, and it was now proposed that lectures should be given during the continuance of the exhibition by British and French men of science.